Pathfinder Guide Dogs Inc.,
2223 Eliot St.,
Detroit, Michigan.
July 10, 1951.

The Editor-in-Chief, "Outlook for the Blind,"
American Foundation for the Blind,
15 W. 16th St.,
New York, N. Y.

Dear Sir:

I am a citizen from the Republic of Haiti, blind from birth. I have just completed the Harvard Teacher-training course given at the Perkins Institution in Watertown, Mass. and will be in charge next fall of the first school for the blind in Haiti, the St. Vincent School in Port-au- Prince which by the way will be substantially helped by the American Foundation for Overseas Blind.

I wrote my final paper for the Harvard Course on the various reading systems devised for the blind throughout the ages. Some friends of mine, on reading the above-mentioned paper, remarked that the Outlook occasionally printed treatises of this sort in article form and they thought that the material contained in mine would be of interest to the blind and those engaged in their education. If the informations conveyed by my paper can be of any value to your readers, I would be more than happy to see them printed in the pages of your magazine. I am therefore sending you under separate cover a copy of the paper referred to and will leave its publication up to your judgement and evaluation. I would appreciate very much hearing from you on the matter.

Very sincerely yours,

Léon Gillard

July 31, 1951

Mr. Jean A. Sorel
Pathfinder Guide Dogs Inc.
223 Eliot Street
Detroit, Michigan

Dear Mr. Sorel:

Your letter of July 10 to the editor of the Outlook for the Blind has been referred to me for answer. I have been very much interested in the paper, "From Carved Wood to Talking Stylusses", which you sent for the possible publication in our magazine. I regret to say that the paper is longer than the articles we usually publish in the Outlook and that we, therefore, will not be able to use it for that purpose.

We are, however, very much interested in the paper and wonder if you would be willing to let us keep the manuscript on file in our library to serve as a source of information for the many people who use our library. Hoping that you will be willing to give your permission, I am holding the paper until I hear from you.

Thanking you in advance and kindest regards, I am,

Sincerely yours,

Helga Lende
Librarian

HL:lf

241 West Cathon St.,
Boston, Mass.
August 16, 1951.

Miss Helga Lende, Librarian,
American Foundation f of the Blind,
15 W. 16th St.,
New York, N. Y.

Dear Miss Lende:

In answer toyour letter of recent date addressed to me at the Pathfinder Guide Dogs Inc., I take pleasure in authorizing you to keep in your files for the stated purpose my paper on the development of reading systems for the Blind. You may also publish parts or a condensation of it in the "Outlook" at any time.

Very sincerely yours,

Jean A. Sorel

Jean A. Sorel

[illegible] WOOD TO [illegible]

Written by Jean A. Sorel
Harvard Class, 1951.

Contents.

INTRODUCTION

Have the blind ever stopped to wonder what impression the sighted world has of them? Not a few of them fail to take the trouble of looking into this matter. Yet how helpful, instructive and stimulating it would be for us to have a clear knowledge of the conceptions formed about us! Let us consider a few cases where the sighted view the blind in action.

The sight-possessing individual who sees his non-seeing friend rythmically moving his fingers over a page covered with what looks to him like odd, meaningless pin-points and hears him utter, as he does so, the exact words of an article that he had read in the current issue of the Reader's Digest, cannot register such an experience with complete indifference. Nor will it appear exactly commonplace to another sighted person to see his blind companion turn on a record-player, to hear coming out of the machine a professionally enunciated rendition of one of Churchill's fiery speeches, and upon inquiry, to learn that here, in the pile of records lying in front of him is the book "Blood, Sweat and Tears" in its entirety. The college student who observes his sightless classmate as the latter is punching dots through a thick sheet of paper placed in a rulerlike frame, and finds that these dots represent notes taken on the last lecture, will be no less impressed than the business employer who reads into the ediphone letters which, a few hours later, will appear impeccably set on paper by the accurately-pressed keys of his blind secretary's typewriter.

The sighted generally react to us and our tools in two different ways. To most of them we are a wonder, an inexplicable mystery. Aghast, they consider our skills and appliances as extraordinary, incomprehensible, almost supernatural. As for those few who have had a long and close contact with some blind person, they have grown so familiar with our means of overcoming our handicap that they have become second nature to them. They do recognize their high value and elaborate operation, but they almost take them for granted as they do radio or automobile.

But one thing that sighted and blind alike very seldom remember is that

less than two hundred years ago there existed not one of the dozens devices without which blindness today would be considered a state of complete helplessness. Reading being the basic means of acquiring knowledge and establishing contact with the outside world, countless attempts were made throughout the centuries toward making it available to the blind. These bold and courageous attempts in time successfully reached their goal and in the process, brought about the creation of a great many of the devices referred above.[10] The aim of this paper is to sketch briefly the history of the adaptation of reading to the sightless, and taking into account the various tools developped in conjunction with it.

GROPING AGE

In an account of the progress of the blind through the ages published in the "Revue Pour Tous" in the year 1888, Dr. Guilbeau divides the history of the non-seeing in three different chronological as well as logical periods. "The History of the blind," writes Dr. Guilbeau, "Comprises three main distinct periods: the age of legends, acute sufferings and individual gropings, which lasted from antiquity to the year 1784; the age of creations and applications which started in 1784 and lasted for a century; and the age of logical development in which we are at present."[1]

By placing the end of the second period and the beginning of the third at the start of the 20th century, when electronic devices made their first entry in the field, Guilbeau's outline becomes a most appropriate one for a discussion of the acquisition of reading by the blind, and such is the outline that we shall endeavor to follow in this paper.

The history of the blind from antiquity to the 18th century, except for an occasional Homer, is a sad trail of beggary. The first recorded case of a successfully educated blind individual is that of Didymus who lived in Alexandria in the fourth century A. D. Didymus,[2] who won great reputation as a teacher and theologian, had learned to read by means of an alphabet carved on wood. With separately carved letters, he constructed words and sentences. We may look to Didymus' carvings as the first beginnings of touch reading. Didymus' achievements, however, were the heroic accomplishments of one outstanding man. His system was never followed, it went with him to the grave. It emerged only as a testimony to what a genius can perform and what the human mind can invent when faced with seemingly unsurmountable obstacles.

Twelve hundred years were to elapse between Didymus and the next consideration of the problem of reading for the blind. At crucial points in the history of the sightless, it seems that philosophers are always the first to stir problems and hint at solutions which later will be adopted and improved upon by educators. Just as it was the Rousseau-

Voltaire-Condillac triumvirate which paved the way for Hauy's work, so do the famous blind of the Renaissance period owe a good part of their success to two scholars in the ideological realm of the late Middle Ages. In the middle 1500's Gerome Cardan, an Italian scientist and philosopher, affirmed the possibility of teaching the blind to read through the sense of touch. The letters he proposed were to be characters in relief and involving points. Indeed it can be said that his system had a remote resemblance with the present universally used Braille alphabet. A few years later, in Spain, another scholar, Francisco Lucas, published an essay (Arte de escribir) which he dedicated to his king (Philip II) confirming Cardan's assertions. Not content with pure theoretical thinking, Lucas produced a model of his carved alphabet for experimental purposes. These pioneers set the ball rolling for more individual investigations and inventions which in turn encouraged more trials and errors that were ultimately to produce results far beyond the most optimistic expectations of their originators. Among the experimenters of that time who deserve recall, let us mention Pierre Moreau, whose advocated letters consisted of raised movable characters; Swingberger who made his characters out of tin; and Francesco Lana whose type was a combination of squares and dots on a board to which strings were fastened. None of these, however, was of any definite practical use to a blind person until a new Didymus entered the scene.

At this point it might be interesting to make an observation which the history of the progress of the blind through the ages imposes to whoever makes a careful study of the question, and that is, that in the advancement of the sightless toward a complete victory over their handicap, the blind themselves were the ones who took the most decisive and revolutionary steps. Didymus, Jacob of Metra, Braille and Moon are typical examples which immediately come to our minds. Reviewing the state of the blind in his country, that fact was so evident to him, that Maurice de la Sizeranne, blind, a

talented author, a life-long worker in the cause of his brothers in blindness and an unquestionable expert in typhlological matters, remarks: "In France all the important inventions which have altered in a favorable manner the condition of the blind were conceived or perfected by either the blind themselves or by sighted individuals renouncing their ideas as seeing people."

In the light of the foregoing it was natural that the second practical and practicable step in the evolution of touch reading should be taken by a blind. It was the result of the resourcefulness of the German Jacob, native of the village of Netra. Jacob devised an alphabet the letters of which he made out of notches cut in small sticks. He managed to accumulate a set of bundles of notched sticks which constituted a useful and sizable library. Having succeeded in becoming an able herb doctor and a man of great wisdom, the German villager made use of his notched-stick system in labeling his medicinal preparations. If Jacob's system, like that of Didymus, was doomed to a quick extinction, his courage and indomitable will to overcome his infirmity were to spread themselves to the four corners of Europe during that golden age in the History of the blind, the 18th century. While the German Weissenburg was avidly devouring the lessons in Mathematics, Physics and Geography which his tutor Niesen was teaching him with the help of ingeniously constructed devices and the English Metcalf was being called upon to build these sturdy roads of which he alone had the secret, the British Saunderson, aided by his famous pegboard, was expounding in Cambridge the Newtonian theories and the Austrian Maria Theresa Von Paradis was traveling on her European conert tour which was to become Hauy's major inspiration. All of these, it is true, were manifestations of invincible individual courage. But a drastic change of attitude had taken place since Didymus' time. No longer were attempts to be scattered and efforts, isolated; but by the tie of a raised-letter correspondence were to be established a communion of desires and ambitions, a fellowship of aims and aspirations.

Era of Creations

The outstanding and coordinated achievements of the famous 18th-century blind could not go unnoticed. Interest in the sightless found revival first in the philosophers. Locke, Molyneux and Berkely wanted to find out whether sight was capable of correctly identifying a shape here-to-fore distinguished only by touch. Diderot took up the same theme, adding his own conclusions. As for the educative acility of the non-seeing, it was soon to be the concern of a young linguist and profound thinker, Valentin Hauy. Sensitive by nature, Hauy first felt sympathy for the prisoners of the night in the year 1771 when a group of grotesquely dressed blind men were made to present a burlesque attempt of a musical performance to the amusement and ridicule of the attending crowd. Hauy's confidence in the educability of the non-seeing was aroused one day when a blind beggar, having received a larger coin than he was wont to receive, returned it thinking that the donor had made a mistake, event which impressed upon Hauy among other things the acuteness of touch possessed by those deprived of the sense of sight. From that day the young philanthropist decided that he would take upon himself the task of opening to the blind the doors of education. With no other means than his meager private funds, he embarked upon that bold venture, taking as his pupil a young boy named Francois Lesueur blinded from the age of six months.

Hauy's success with Lesueur won the support of the Philanthropical Society and the number of his pupils soon increased. With his first pupils Hauy used movable letters of the Sclavonian type. Due to the cost and manufacture of these letters, progress was necessarily very slow until an accidental happening completely changed Hauy's methods and opened a new era of hope and promise in the history of the blind. Lesueur, trained in the art of printing, was one day taking out of the press sheets of printed paper when he noticed to his surprise that he could feel with his fingers on the back of one of these sheets the reversed shape of the letters printed on the right side. He reported his experience to his teacher who saw in it the magic key so long sought after. Hauy immediately had enlarged types constructed in their reversed

shape which, when pressed on a sheet of wet paper, appeared on the back of the paper in relief and in their correct position. Thanks to this much cheaper and easier means of producing books readable by touch, Hauy's pupils would be able to learn unaided the elements of Grammar and Arithmetic, they were going to be able to penetrate through touch the content of an essay written about them, the organized education of the blind was at last going to have a sure start, the sightless had obtained the victory over ignorance.

The characters employed by the first director of the "Institution Nationale des Jeunes Aveugles" of Paris were enlarged italics, later, Hauy's successors Dufau and Guillié introduced some slight modifications in their structure. Praise and admiration were not always the rewards bestowed on Hauy, the work and method of the great philanthropist met with many harsh criticisms. The chief ones directed against his reading system were that its reading was too slow to allow an intelligent comprehension or enjoyment of the text, ant that it would be too costly to produce books which in turn would be too bulky. But one fact which more than makes up for its defects is that it was the first, anf for many years, the only generally accepted and successfully readable print for the sightless. From France the new alphabet for the blind spread throughout Europe, adopted as it was, worked upon or altered. The British Isles were probably the country which gave rise to the greatest number of different embossed scrips. Although asylums for the care and handicraft teaching of the blind existed in Great Britain as early as 1791, it was not until the year 1821 that the first embossed book found its entry into England. Introduction of raised type in England was due to Mrs. Elizabeth Towther who had imported books forhers blindson Charles from the Paris Institution. No sooner had the idea of relief printing taken foot in England, however, than a score of different systems made their appearance, representing all shapes and meanings of symbols from Gaul's angular Roman letter, through Lucas' and Hatly's stenographic types, to Frere's phonetic system. A general and most costly controversy ensued, with everyone maintaining that his

system and his alone was the right one while all the others were either incomplete, imperfete or of just no use. To put an end to that utter chaos, the Scottish Art Society organized a contest and offered a substantial prize for the system of embossing which would prove the most practical. Out of that contest came twelve systems using arbitrary signs and eighteen, based on ordinary type. The Scottish Art Society's golden medal award went to Dr. Fry whose proposed print was a slight deviation from embossed Roman letters. The Scottish Art Society's sanction and the acceptance of the Fry type at the Glasgow Asylum were far from putting a stop to the "Battle of the Types." It kept on raging with more and more violence as new inventors were adding to the fire the fresh fuel of their various scripts. The following quotations will give an idea of the high estimation that inventors of that time had of their types. In his introduction to the presentation of his system, T. M. Lucas writes: "It is with heartfelt pleasure that I embrace this opportunity of announcing, in the seventy-third year of my age, that, through the kind permission of God, the blind are now taught to read in as short a timeand as fluently as those who can see, and that their books are reduced more than one half both in size and price.[3]" Lucas goes as far as to attribute divine qualities to his type composed of twelve combinations of dots and circles: "it evidently appears that these simple characters are of divine origin; perfect in their number, to which there can be no addition; immutable in their nature, so that they cannot undergo any change; and universal in their application, and therefore these simple signs have been ordained, by the wisdom of God to be compounded and applied by man to every purpose under Heaven.[4]" Gall was not much more modest when he wrote: "Not more certainly did Galileo predict of his theory in astronomy, or Bacon, his theory of philosophy, or Newton, his theory of gravitation, than do I, for a successful litterature for the blind, as simple, as acceptable, as economical, and nearly as portable as the common litterature of the day.[5]" No wonder Armitage had to exclaim "It is evident that the question so often put--which is the best system of raised characters?--is one more easily asked than answered.[6]" Elsewhere in Europe, new types made their appearance, following the same line. Zeune in Germany and Carton in Belgium introduced an innovation.

They included raised points in the formation of their characters. But their letters were still of the Roman type, the dots served only to trace the outline of the letters. It was at that time also that the blind Thomas Moon from England issued his system whose superiority over all other line types is evidenced by the fact that it has outlived them all. Moon derived eight very simple symbols from the Roman letters which, placed in different positions, produced all the signs of his system. To avoid loss of place and time in changing lines, the first line of the Moon type reads from left to right and the next line, joined to the line above, reads from right to left, all the other lines following the same pattern. Moon characters possess a great amount of tangibility and can easily be printed from bits of wire affixed to metal plates. Moon type has survived up to the present. Aged persons who lose their sight late in life find it easier to read than Braille. Adapted to 493 languages, its printed matter enjoys a yearly circulation of 200,000 volumes.

The education of the blind had its start in America at the time when the Battle of the Types was at its pinnacle in Europe. Since wherever there are schools, there must be reading material, the United States were now to contribute their systems of raised print. The first work in relief characters to appear in the U.S. was the Gospel of St. Mark printed at the Philadelphia School for the blind by Jacob Snider Jr., recording clerk of the board. Snider's type, very similar to Gall's system was soon converted into a new one produced by Friedlander, Director of the Philadelphia Institution. A few other systems rose in various schools here and there throughout this country, the one enjoying the most general use being that devised by Dr. Samuel G. Howe. Recently returned from a tour of Europe where he had studied the various kinds of embossings, Dr. Howe designed a system known as the "Boston Line Type" regarded by several authorities as the most satisfactory of all line-letter systems. Howe's characters were mainly raised angular Roman letters. In order to make his letters more perceptible to touch, the author of the Boston Line type modified the characters which were very similar, emphasizing their differences. In 1851 Boston Line won an award at the

Crystal Palace Exhibition and two years later was proclaimed the official type for the blind in the United States by the American Association of Instructors for the Blind. From then on Dr. Howe's system held the field unchallenged in America until the coming of Braille.

Although each system claimed some advantages over the others, the sharpest line of controversy divided the arbitrary types from those based on the Roman alphabet. The advocates of the latter maintained that the adoption of arbitrary signs would compel the adult blind to learn a whole new system in order to be able to read, would increase the wall of difference between the seeing and the sightless, would deny the blind reader the help of a sighted companion. But those who favored the unconventionaltypes could not agree that these imperfections justified a painful, unintiigible reading and the output of voluminous, prohibitively costly books. As an arbitrary-sign supporter, refuting one of the arguments of the Roman-alphabet partisans, puts it, "If we have to choose between a character in the reading of which the blind can be assisted by the seeing, and one which is so simple that no assistance is required, there can hardly be a doubt as to which ought to be used." But tradition and cultural lag lent their forces to the Roman letter, and it was not without a bitter fight that the Roman sign retreated before the arbitrary character. Even after the superiority of the arbitrary dot over the Roman character had been established beyond any shadow of a doubt, a Carton found nothing better to do than to represent the latter by the former, thus "showing," to quote Armitage again, "How tenaciously a clever man clung to the Roman letter, even while abandoning it."

All the printing systems so far referred to were devised with the false assumption that touch is a direct substitute for sight and that therefore looked good and plain to the eye must of necessity look the same to the fingers such an erroneous conception could not help but result in unreasonably bulky volumes hardly readable by those for whom they were intended. It remained for the punctographic systems to remedy the situation and improve the [illegible] of the blind.

The French Charles Barbier was probably the first person to discover the huge tangible superiority of the point over

all other geometrical designs and to make a practical use of it. Barbier, an artillery officer, was not thinking of the blind at all when he produced his invention, he designed it as a means of writing war messages that could be read in the dark. Barbier's "ecriture Nocturne" comprised two vertical rows of six dots each, the various combinations of which represented ciphers interpretable by the help ofa code. Barbier's system requiring touch reading, the National Institution for blind Youths of Paris decided in the early 1820's to give it a try-out with the view of adopting it as a reading type for its pupils if it proved successful. It was at the Paris school that the student Louis Braille became acquainted with Barbier's "Night writing." He found its symbols too high to be identified at one stroke of the finger and objected to its phonetic spelling and its use of a code. To remedy those inconveniences, Braille cut Bargier's symbols down to half their height and gave a different sign to each individual letter, thereby creating his own system which bears his name (Braille). The new type contained 63 systematicly arranged signs logically deductable from one another, designating all the letters of the alphabet, the numbers, a musical notation, mathematical and ~~and~~ chemical signs, and even, nowadays, groups of letters or whole words. Among braille's chief advantages are: the unequalled tangibility of its symbols, the smallness of their size which makes them readily discernible by one finger, their logical sequence and the extreme simplicity with which they can be written. To write braille, one uses a frame called Braille slate, which today, is of the same basic structure as when it was devised by its French inventor in 1829. The Braille slate ~~slate~~ is made up of two sets of corresponding cells containing six holes each (three vertically and two horizontally). In writing, a sheet of hard paper is placed between the duplicate cells, and through the holes of the cells and through the paper dots are punched by means of a blont-pointed stylus. Since the largest braille symbol comprises no more than six dots, only one cell is used for each individual sign, and as the dots appear in relief on the side opposite the one through which they are inserted, writing proceeds from right to left with the dots made in the reverse of their desired location.

In spite of its unquestionable advantages, braille had to wage everywhere a fierce struggle against line type. In its native France it did not receive official approval until the early 1850's, about a decade after the death of its inventor. In the year 1860 it reached the United States and only fourteen years later did it make its entry into Great Britain. But everywhere that it obtained a foothold, line type was automatically irradicated. In the U.S. It made its first appearance in the Missouri School for the Blind, where, due probably to the extreme facility with which it could be written, it was first used as a medium of romantic communication between the boys and girls of the student body. The abandonment of line type in favor of the dotted alphabet in America was due to the indifatigable efforts of William Bell Wait, superintendent of the New York Institute for the Education of the Blind, 1863-1905. Mr. Wait carried out a careful experiment with braille and line type in various schools for the blind of this country. He found that out of all the students using line types, only one third read satisfactorily well while another third failed completely. As for the braille users, 65 percent of them gave a satisfactory result, while none of them failed entirely. If this exprriment convinced Wait of the preferability of the dot to the line, it was far from persuading him that braille is what the dot should be made to produce. Wait found two faults with braille: (1) its failure to take into consideration the frequency of recurrence of a letter in determining the number and arrangement of the dots it should contain; (2) the fixity of its cell (3 dot high and 2 dot wide) which prevents any horizontal extention of a sign. John D. Russ, first director of the New York Institute, gave Wait the system which would redress braille's faults, of which system Wait became so staunch an advocate that certain authors have granted him its paternity. To correct the first of the two imperfections of the braille type referred to above, Russ compiled an exhaustive table of letter recurrences, giving preference in simplicity to those letters which occurred most frequently. The second defect was remedied by the structure of Russ's slate. The cell of the New York System (also called New York Point,) is a square made up of four dots, two in height and two in width.

The space between the cells of the New York slate was the same as the one between holes of the same cell, so that some New York Point signs occupied two or even three cells in length. Since, unlike braille, the New York system did not use the cell as its letter unit, letters were separated from each other by skipping one hole between them, word separation was indicated by the skipping of two holes. From the foregoing it can be readily seen that the New York Point signs, no matter how many dots they comprise, are separated from one another by an equal, minimum space, while the braille symbol, whether it contains one of six dots requires the space of a whole cell plus that of the separation bar between the cells. Thus when the fewest and most conveniently placed dots are given to the most frequently occurring letters, an appreciable amount of space is gained. Still more space is saved by the line of the New York System being one third less in width than the braille line. The gain in space of New York Point over braille was found by tests to be of 33 percent. This gain in space was, because of the letter-occurrence provision, accompanied by a corresponding gain in writing time. Another argument presented by the advocates of the New York Point is that the characters of the Russ-Wait system could be enlarged to suit the worn touch of the adult blind. This argument however does not hold very well, as will be shown later in the discussion of the advantages of braille over the New York System.

Against the above-mentionned arguments of its American rival, braille opposed the following: braille was universal while the New York system could only be national, since the rate of letter occurrence varies with each language. The adoption of New York Point would therefore make it impossible for the blind of one country to share the literature of another and would compel the blind language student to struggle with an entirely new system every time he learns a new language. The second feature of superiority of braille over New York Point is the great reading speed allowed by the former. The braille

characters (3 dots high and 2 wide) fit exactly the forefinger so that any sign in that system can be recognized at one stroke of the finger, while the new York Point symbols, comprising up to four dots in horizontal length, requires that the finger move a distance equal to twice its width to identify them. This is why if the letters of the New York System were enlarged, although they would be of a suitable height for the finger, their much extended width would present considerable difficulty to the reader.

Another great advantage of braille over the Russ-Wait System is the logical order of the letters of the French type, which makes it possible for any litterate person, blind or sighted, to master the whole system by memorizing only the first ten characters. Finally braille lends itself perfectly to corrections, while in the New York System this is almost impossible. A reexamination of the braille and New York Point slates would be of great help in comprehending this point. In a braille-written item, when a letter is to be substituted to another, since the braille cell is the letter unit, all one has to do is to scratch OUT the character to be corrected or part of it, count the letters and spaces on the line in question and punch in the proper cell the necessary dots. Since New York Point letters have no cell boundaries, to effect the same process in the N. Y. System it is necessary to combine mentally the number of cells with the exact letters in the line concerned, and having arrived at the place where the correction is to be effected, since the continuation and termination of the N. Y. characters are denoted by the presence or absence of dots, all audition or subtraction of even one dot in the horizontal direction would alter the meaning of the whole line.
Such were the considerations which lead the British and Foreign Blind Association to anopt for england the French Type in stead of the American.

In Boston, meanwhile, Michael Anagnos, Director of the Perkins Institution, realizing that line type was doomed and set against any idea that emanated from New York, entrusted to Joel W. Smith, tuning instructor at P. I. and former teacher at the Royal Normal College in England, the task of devising a new dotted system. Instead of going into a new invention, Smith preferred to make some slight transformations in braille as it had been created by its French author. Smith letter-symbols were constructed in such a manner as to meet letter recurrence requirements,

and although braille's fixed cell was kept space was saved by the adoptions of contraction signs. Thus was born was has been known as "American Braille" which was nothing more than pure braille with the original signs given new meanings.

For almost a century, a life-and-death controversy known as the "Battle of the Points" raged just as fiercely as the 19th-century "Battle of the Types" between New York Point and American braille, spreading itself to the intellectual, political, as well as financial front. It was not until 1925 that the regrettable war was brought to a close by the safe and dignified retreat of both foes before British braille. British braille, the original braille alphabet augmented by a vast number of contractions, was thus universally adopted in the U. S. under the name "Revised braille" and divided into grades one, one and a half, and two, according to the number of contractions they contained. That settlement seems to have solved forever the deplorable and wasteful controversy and to have given America its final point system.

We would be guilty of an unforgivable omission if we ended the discussion of the point systems without referring to the most important factor responsible for their universal spread. The dotted types, as we have stated before, were written by means of a stylus which punched points through heavy paper. Each dot was made separately, hence the time consumed by a character was directly proportional to the number of dots it contained. If therefore an instrument could be found whereby all the dots of one letter could be punched at one stroke, what a considerable amount of time would be economised! Such an instrument was exactly what Frank H. Hall, Superintendent of the Illinois School for the Blind, set out to find. Stricken no doubt by the fact that the letters of the newly-invented typewriter, like the signs of the Braille system, always occupied a definite space whatever their size, the Superintendent of the I. S. B. resolved to design a braille-writing machine on the typewriter principle. The machine that resulted from Hall's inventive search was composed of six letter-keys grouped in two rows of 3 on either side of a space bar. These letter-keys correspond to the dots of the braille cell and action styluses which punch the paper from underneath, thus making it unnecessary for the writer to reverse his characters as he does when writing on the slate, and allowing him to read what is being written without losing his place. If such undreamed-of results could be obtained

in writing on single sheets of paper, why could not the same principle be applied to metal plates from which multiple paper copies could be made? Hall's next step was naturally to devise a stereoplate, and make the production of books for the blind almost as rapid and easy as that of books for the sighted. The revolution in braille writing brought about by Hall's inventions were sure to give Braille the final victory over Wait, but the indomitable Superintendent of the N.Y.I. was not to be "caught napping." The watchful Wait carefully studied the Hall brailleswriter and modified it to suit his system. Wait's machine, which he named "Kleidograph," consisted of eight basic keys disposed in two horizontal rows of four keys that actionned corresponding styluses placed underneath the paper in the same position. Wait's kleidograph had two space bars: one to separate letters of the same word and the other, to separate words from one another. It also contained six additional keys which produced various combinations of the eight basic dots, thus making the machine operable by one hand.

Touch of New Developments

Since the latter part of the 19th century braille had won complete supremacy in Europe, while in America, Smith's and Wait's versions of it had swept away all other touch systems. No longer were efforts concentrated on the search of new touch-discernable types, they converged rather to augment more and more the amount of literature in dots. If the point gave the optimum response to tactual perception, it was no less true that touch itself was not the perfect reading substitute for sight. If the point systems did meet the needs of all the students in schools for the blind and were learned with comparative ease by young adults, those blinded in their fifties of sixties and who constitute the majority of the sightless population, were far from getting the best results. A survey carried out in the late 1920's revealed that only 25 percent of the blind population of the U.S. were able to read braille before the proven inadequacy of touch, another sense was to be appealed to. Of the three remaining untried senses, hearing being the most promising, was naturally the next to be approached.

Blind individuals of all time have always depended heavily on sighted readers. Dr. Richard French[10] tells us, concerning Didymus, "with specially carved letters he constructed words and sentences, but most of his study was gained through hearing others read." In the reader-listener operation, granted normal hearing on the part of the listener and clear diction on the part of the reader, as much information can be acquired through the ear and almost as fast as through the eye. If therefore the blind could have at their disposal readers whenever and wherever they need them, or in other words, real "talking books," their reading problem would be completely solved. It is interesting to note that the first time the word "talking book" was used, the meaning had placed the non-seeing in the servicing end. The term was first used by Dr. Howe in a stylish and picturesquely-worded description of the occupation of certain blind professional Japanese historians.

"It must have been a singular sight to visit this library of talking books, and to have consulted these talking archives. Instead of pulling down a musty folio to seek for a historical fact, you would walk up to a blind man and ask if he were the depository of such and such a century, he would answer yes, or else that his neighbor farther down was the right volume."

With the advent of the phonograph, hopes of finding that ever-serviceable "talking book" increased immensely. Were there not in fact records thanks to which pieces of music or short poems could be heard anywhere, at any place and any number of times? But these records played only for three minutes per side. But recording a large-size book on them would require far too many records and would necessitate far too many interruptions in the reading for turning and changing the records to make the plan feasible. Some way had to be found whereby the revolving speed of the record would be diminished and its grooves, placed closer to one another, in other words, some means of making one record play for a longer period of time. Already in the early 1920's George F. Meyer, then superintendent of braille classes in Mineapolis, was making use of dictaphones to help blind pupils in public day classes. It was in the year 1927 that the first practical model of a long-playing record was produced, it was the work of Captain Round of the Marconi Company in England. The considerable importance to the blind of such an invention was so well realized that the news was at once cabled to America by the London correspondent of the New York Times and the next day was printed in newspapers all over the country. St. Dunstan's and the National Institute for the Blind immediately seized upon the idea, an began experimenting with and producing talking books whose records, turning at 24 revolutions per minute compared to the 78-R.P.M. commercial records, played for 20 or 25 minutes per side. In 1932 Robert B. Irwin, then Executive Director of the American Foundation for the Blind, pioneered the new reading device in the United States with all the zeal that he could muster and the A.F.B. studios began turning out talking books (of 33.1/3R.P.M. records) at an ever-growing pace. Here the advantages of the talking books were so well understood and Mr. Irwin's campaign, so successful,

that three years later the Library of Congress made an appropriation of $ 75.000 for the production and circulation of recorded literature for the blind. In the meantime the British had adopted the 33-1/3-R.P.M. speed, thus reading material on records both in Britain and America became available to the blind of the whole Anglo-Saxon world.

A talking book is nothing more than a set of semi-flexible celuloid 12-inch L.P. records on which an able sighted reader has recorded a whole book. Each talking book record bears its page number labelled on one side in Braille (~~in America~~) and on the other side, in print (in America) and in Moon Type (in England). At the beginning of each side of a record, the reader announces the page number of the side followed by the title of the book and he concludes the side with "This book is continued on the other side of this record," or "This book is continued on the next record," according to the case, thus sparing the blind reader the time and effort of checking the label.

The talking book has provided the opportunity of reading to countless blind people who have not been able to learn braille, it has meant time-saving and additional reading pleasure to the slow braille reader, to every visually handicapped person the easiest and most comfortable kind of reading. Its success and popularity among the sightless is such that at present the output of talking books almost equals that of braille, while the production of the former tends to increase more and more.

The advent of the electronic age also made its contribution to the development of reading for the blind. It too made use of the ear as a substitute for the eye. It is not within the scope of this paper to attempt a discussion of the technical details of the various devices produced in this area; it will limit itself instead to a few remarks concerning the action and operation of the most promising as they appear to the lay observer.

If Willoughby's discovery in 1873 that the electrical resistance of celenium was strongly influenced by light and Bell's invention in 1880 of the photophone paved the way for numerous devices in the fields of entertainment and warfare, they did not fail to

to catch the attention of scientists interested in the education of the sightless. Already in 1902 V. de Guirne was producing his special photophonic books, with letters represented by transparent squares scanned by masks with apertures to match squares. Rays of light passing through the openings of the masks are changed by the celinium cells to sounds. In 1912 Fournier d'Albe invented the optophone which at first was intended as a guidance instrument. Letters scanned by the optophone are transformed into combinations of the arpeggio notes of the G major key. The optophone which, beside the visagraph, is the only electronic reading device developed to testing stage, although making print letters actually readable without the help of the eye,, confronts the reader with an unpracticably slow and painful process. The speed attained by most of the users of the instrumentswas about 15 or 20 words a minute, while only one person claimed the top maximum of 45 words a minute.

D'albe,s invention was followed by quite a few attempts on the same order. In 1915 F. C. Brown produced his Phonopticon which made use of a pair of celinium cells, one to scan the upper part of the characterz and the other, for their lower part. Variety in light refraction produced a variation in the intensity of current signals flowing through the ediphone. Six years later appeared the typophone, slow-playing phonograph records on which the subject matter was recorded in Morse code. In 1924 the firm of Mertens put out its instrument which made electrical contact with symblols printed in conductive ink. Among the other scientists who made their contribution in the search of a mechanical reader for the visually handicapped are: B. S. Rosing, O. Schutkowsky and Simon Ramo. Of the various reading machines which came out during the late twenties and early thirties, the visagraph and the electrograph were the most practical. In the first model Naumberg's visagraph, the book to be read was placed in the mach and rays of light reflected unto a celinium sheet were thence t to a buzzer; letters were distinguished by vibration. The sec employed six exploring beams of light modulated at different six electromagnets, one of each frequency, made raised i pr of the scanned characters on an aluminum sheet. If the vis its raising and enlarging ink designs, has made the

too slow for the blind, it has been of considerable value to the partially seeing and has rendered great services to the blind as well in relief reproduction of maps and diagrams. As for M. Thomas's photoelectrograph, it produced relief images of letters in dots. In the 1945's the Radio Corporation of America entered the field and came out with an instrument which could be called, a greatly-improved optophone. Slick, compact, extremely portable, it still required considerably too much time to use.

The need for the blind of a medium through which they would acquire unaided ideas expressed in ink has never been questioned. It was so well recognized that since 1946 a group, known as the committee on sensory devices, was constituted at the American Foundation for the Blind to study, investigate and work toward the creation of just such a medium. The C.S.D., going away from the integration-type (letter-reading) machines, for the sake of speed, it is concentrating on the non-integration-type (word or syllable-reading). In a language such as English which contains an infinity of different sounds, the speech from this kind of machine would at best be a wuhzy one and would require some intelligent guesswork on the part of the reader. The C.S.D. is looking for a machine which can serve the average blind person, the factors most sought after therefore are: speed, facility of operation, low cost and portability.

Concluding Notes

The history of the blind from antiquity to the 18th century was nothing but a sad trail of beggary. Education is the basic factor w' utterly changed the intellectual, economic and social status of t non-seeing, an education obtainable only after reading had becom a possibility for the sightless. The acquisition of reading h has been a process, a slow process, but a constant, uninterrupt cess. Conceived in Didymus' carvings, the idea of reading for made several bids for self-fulfilment through the philosophe perimenters of the 17th century until Hauy blew on it the f life. Braille set it definitely on its feet and the Thomas

strengthening its hold. The cycle is far from being completed, the electronic age is lending it a hand, translating print characters into sounds, dots and relief symbols. If these have so far proved less effective than existing means, let us remember that improvement is being made everyday, and research, carried on. Those who are deprived of the sense of sight have good reasons indeed to look with justifiable confidence to the future.

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Bibliography

Alston, John, To the Directors of the Institutions for the Blind in Great Britain and Ireland, Glasgow, the Scottish Guardian office, 1837.

Armitage, T. R., Esquire M. D., Address at the Leicester Blind Institution, February 12, 1869.

Armitage, T. R. Esquire M. D., On the Modes of Reading in Use by the Blind, and the Means for Arriving at Uniformity, London, 1870.

Armitage, T. R., M. D., Reply of Dr. Armitage to a Pamphlet by Mr. Hait, London, 1873.

Bell, Alexander Melville, Universale Line Grating Mr. Stone-[illegible]graphy, London, Simpkin, Marshall and Company, 1869.

Braille and New York System Compared, the Executive Committee of the British and Foreign Blind Association, 1874.

Brown and Holland, Shorthand News, Blind Shorthand, Tacitus, 1883.

Bryan, Frank C., New Devices for the Blind, Outlook, February, 1934.

Chambersss Encyclopedia, No. 62, The Blind, Edenbourgh, W. and R. Chambers.

Cheltenham Chronicle, The Literature of the Blind.

Corner, George W., The Committee on Sensory Devices, Blindness edited by Paul Zahl, (chapter 28) Princeton, N.J., Princeton University Press, 1950.

Diderot, Denis, Lettre sur Les Aveugles à l'Usage de Ceux qui Voient, Oeuvres Complètes, Edition of J. Assezat, Paris, 1875.

Farrell, Gabriel Avenues of Communication, Blindness, edited by Paul Zahl, (chapter 21) Princeton, N.J., Princeton University Press, 1950.

French, Richard S., Ph.D., From Homer to Helen Keller, New York, American Foundation for the Blind, Inc., 1932.

Garagnani, Emilienne, Projets d'Enseignement aux Aveugles Copiemant le Système Morse, Bologne.

Groves, T., The Groves Braille Machine, Worcester, England, 1871.

Guilbeau Edgar Charles, Histoire de l'Aveugle, Hanna Louis Louis, Paris, Septembre, 1838.

Guldbergs, C. A., Schreibapparat fuer Blinde, Copenhagen.

Hauy, Valentin, Essai sur l'Education des Aveugles, , Imprimerie de l'Institution des Jeunes Aveugles, 1786.

Levy, H. Banks, F.R.S.L., A Guide to the Use of Various Appliances for the Blind, London, published and sold at the Depot of the Association, 1864.

Lucas, T. R., Instructions for Theachin the Blind to Read with the Britanic or Universal Alphabet and Embossing their Lessons, Etc., Bristol, Philip Rose and Son.

Meyer, George L., Recording Machine as a Tool for Blind People, Blindness, edited by Paul Zahl, (chapter 27) Princeton N.J., Princeton University Press, 1950.

Moon, William, Lid., Moon System of Reading for the Blind, Brighton, England, 1873.

Naumburg, Robert M., The Printing Finagraph, Outlook, March, 1931.

Report from the World Conference on the Blind, New York, 1932.

Ritter, Charles W., Devices to Aid the Blind, Blindness edited by Paul Zahl, (chapter 26) Princeton, N.J., Princeton University Press, 1950.

Ross, Ishbel, Journey Into Light, New York, Appleton-Century-Crofts, Inc., 1951.

Ruggles, S. P., Letter dated from the Office, 1045 Washington St. Boston, Mass., January 1, 1872.

Russ, S. A., Ed., Experiment, New York, 1909.

Sizeranne, Maurice de la, Etat de la Question des Aveugles en France, Communication faite au Cinquième Congrès Officiel d'Instituteurs d'Aveugles à Amsterdam, Aout, 1885.

Sizeranne, Maurice de la, L'Outillage Intellectuel des Aveugles, et les Impressions en Relief, La Société d'Encouragement pour l'Industrie Nationale, Paris, 1884.

Spectator, The, The Education of the Blind, November 28, 1868.

Wait, William Bell, Report of new york Institution for the Blind, New York, 1871.

Pour Tous," September, 1888, page 74.
anne, Beatrice de la, "Etat de la question des Aveugles en France," 14.
as, T. R., "Instructions for Teaching the Blind to Read With Tehe itanic or universal alphabet," p. III
as, T. R., "Instructions for teaching the Blind to Read etc." page 5.
Ross, Ishbel, "Journey Into Light," page 243.

6. Armitage, T. R., Adress at the Leicester Blind Institution, February 12, 1869, page 7.

8. Armitage, T. R., Adress published in the Journal of the Society of Arts, January 28, 1870, page 198.
9. A rudimentary machine on the same principle was devised by Groves for writing music, 1871. Whether or not Hall knew of the Groves writer, we have no conclusive evidence.
10. French, Richard S., "From Homer to Helen Keller, " page 66.
11. "Blindness," edited by Zahd Faul, page 315.